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Climate variability and productivity response in the westernmost Mediterranean since the last deglaciation: high resolution record from ODP Site 976

F. Martínez-Ruiz (1), O. Romero (2), A. Paytan (3), J. M. González-Donoso (4), D. Linares (4), F. J. Jiménez-Espejo (1) & D. Gallego-Torres (1)

(1) Instituto Andaluz de Ciencias de la Tierra (CSIC-UGR). Campus Fuentenueva. 18002 Granada, España. (fmruiz@ugr.es), (2) Research Center Ocean Margins & Dept. of Geosciences. Bremen University. 28334 Bremen, Alemania. (oromero@allgeo.uni-bremen.de), (3) Department of Geological and Environmental Science. Stanford University. Stanford, CA 94305-2115. USA. (apaytan@pangea.Stanford.EDU), (4) Departamento de Geología. Campus de Teatinos. Universidad de Málaga, España. (jmgd@uma.es)

High sedimentation rates and continuous sedimentation in the Alboran Sea basin provide optimal conditions to obtain high-resolution climate records. Here the time interval spanning the last 15,300 yr was sampled at ODP Site 976 Hole C with centennial age resolution. Past climate changes and the response of climate subsystems have been reconstructed using a multi-proxy geochemical approach. Ba/Al ratios and barite accumulation rates have been used to derive productivity fluctuation. Barite separation by sequential leaching has demonstrated that Ba enrichments are deriving from marine barite originated in the water column and Ba/Al is therefore a reliable proxy in this case. Classical climate events since the Oldest Dryas are recorded within the analyzed time interval. Significant productivity changes also accompanied such events. The end of the Last Glacial Maximun is recorded by a substantial decrease in marine productivity, while the Bølling-Allerød warm period records a gradual increase in productivity to a maximum during the Younger Dryas cold period. The end of the Younger Dryas is marked by a sudden productivity decrease. The last $\sim$11,700 yr record a decreasing trend in productivity until the present, however, short term fluctuations are recognized likely related to abrupt climate changes at millennial time scale. Enhanced productivity during the Younger Dryas is also evident in the biogenic opal and total organic carbon (TOC) records which correlate well with the Ba enrichment at

this time. This high resolution record also shows that productivity events recognized in the eastern Mediterranean, as the deposition of the most recent sapropel S1, are not similarly documented in the West. This is evidence for different climate responses within the Mediterranean basins. The most recent organic rich layer (ORL) recognized in the Alboran Sea basin (at $\sim$ 8,500-14,500 yr) is characterized in general by higher Ba content than the last $\sim$8,500 yr, but Ba profiles do not fully correspond to those of the TOC. This indicates that additional factors are controlling TOC profiles, such as oxygen conditions and preservation. Profiles of certain redox sensitive elements such as Ni also support this idea. The S1 time interval corresponds to lower oxygenation in this basin, but increased oxygenation during the Younger Dryas. The ORL thus represent a combination of enhanced productivity and enhanced preservation due to lower oxygenation. Sedimentary regime proxies such as Zr/Al or Ti/Al ratios indicate significant humidity/aridity fluctuations within the analyzed time interval. In summary, multiproxy records show rapid climate changes during the deglaciation and the Holocene, and productivity changes have immediate response to such changes.